

# Subminiature Dual Channel Optical Sensor with Phototransistor Output

## Description

This device has a compact construction where the emitting-light source and the detector are located face-to-face on the same optical axes. The operating wavelength is 950 nm. The detector side incorporates 2 phototransistors. Distance of both channels is 0.8 mm.



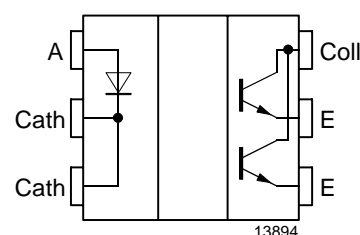
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## Applications

- Accurate position sensor for encoder,
- Detection for motion direction,
- Suitable for computer mouse and track-balls

## Features

- Dual channel with 0.3 mm aperture
- Channel 1 to channel 2 distance 0.8 mm (optical center)
- Gap 2 mm
- Package height: 4 mm
- Surface Mountable Technology (SMD)
- Parts shipped taped and reeled 2000 pcs/ reel
- Soldering method according to CECC00802 table 1, class B or C



## Order Instruction

Ordering Code	Resolution (mm) / Aperture (mm)	Remarks
TCUT1200	0.24 / 0.3	

### Absolute Maximum Ratings

#### Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	25	mA
Forward surge current	$t_p \leq 10 \mu s$	$I_{FSM}$	100	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	75	mW

#### Output (Detector)

Parameter	Test Conditions	Symbol	Value	Unit
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	20	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	75	mW

#### Coupler

Parameter	Test Conditions	Symbol	Value	Unit
Total power dissipation	$T_{amb} \leq 25^\circ C$	$P_{tot}$	150	mW
Ambient temperature range		$T_{amb}$	-40 to +85	$^\circ C$
Storage temperature range		$T_{stg}$	-40 to +100	$^\circ C$
Soldering temperature	$t \leq 5 s$	$T_{sd}$	230	$^\circ C$

## Electrical Characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )

### Input (Emitter)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 15 \text{ mA}$	$V_F$		1.2	1.5	V
Reverse current	$V_R = 5 \text{ V}$	$I_R$			10	$\mu\text{A}$
Junction capacitance	$V_R = 0 \text{ V}, f = 1 \text{ MHz}$	$C_j$		50		pF

### Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter voltage	$I_C = 1 \text{ mA}$	$V_{CEO}$	70			V
Emitter collector voltage	$I_E = 100 \mu\text{A}$	$V_{ECO}$	7			V
Collector emitter cut-off current	$V_{CE} = 25 \text{ V}, I_F = 0, E = 0$	$I_{CEO}$		10	100	nA

### Coupler

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector current per channel	$V_{CE} = 5 \text{ V}, I_F = 15 \text{ mA}$	$I_C$	300	500		$\mu\text{A}$
Collector emitter saturation voltage	$I_F = 15 \text{ mA}, I_C = 0.05 \text{ mA}$	$V_{CEsat}$			0.4	V

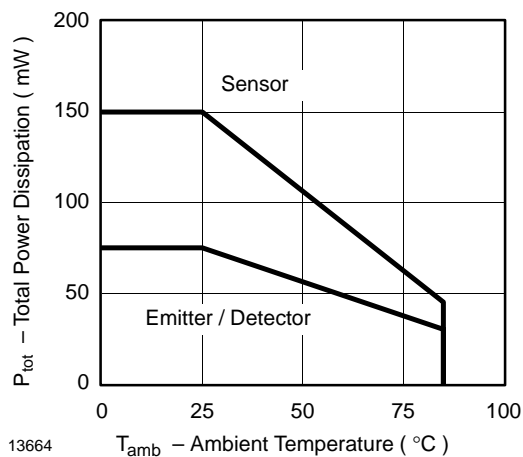


Figure 1. Derating diagram

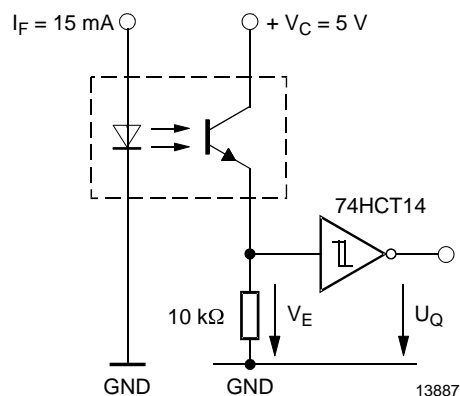


Figure 2. Application example

## Typical Characteristics ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)

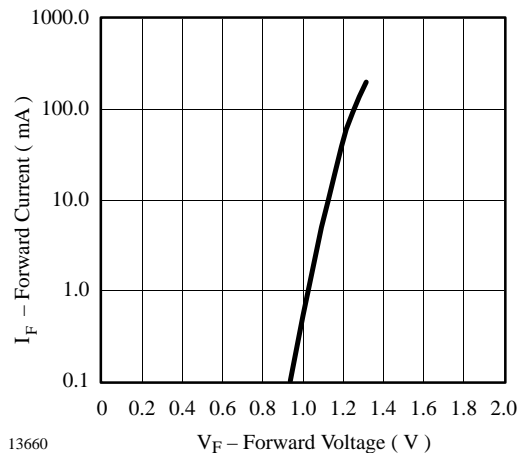


Figure 3. Forward Current vs. Forward Voltage

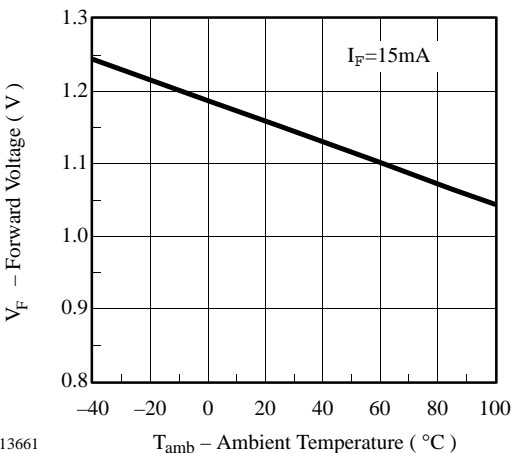


Figure 6. Forward Voltage vs. Ambient Temperature

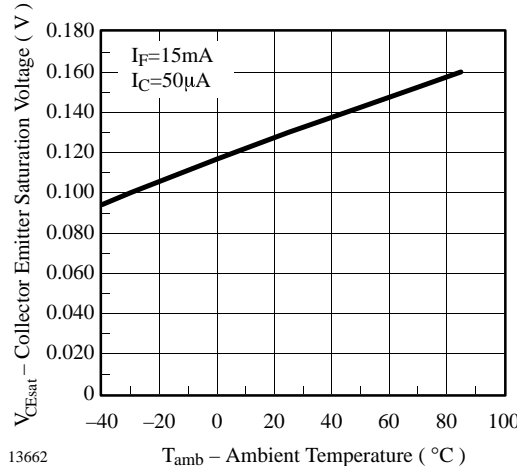


Figure 4. Collector Emitter Saturation Voltage vs. Ambient Temperature

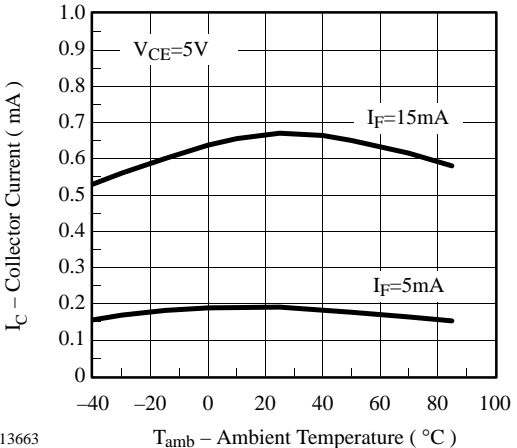


Figure 7. Collector Current vs. Ambient Temperature

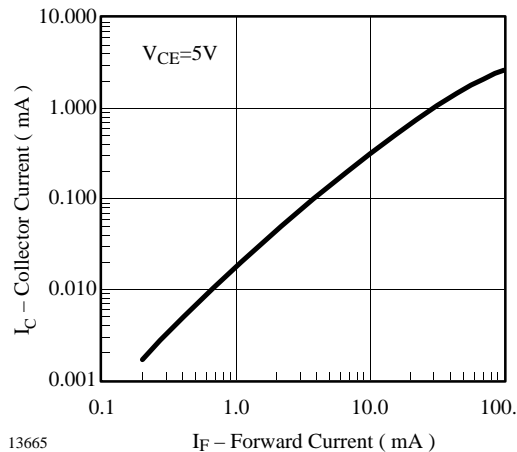


Figure 5. Collector Current vs. Forward Current

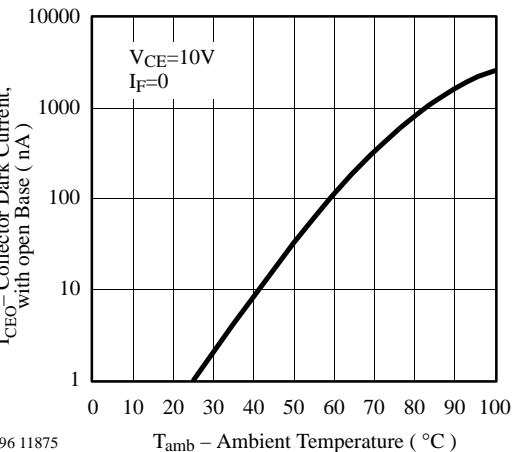


Figure 8. Collector Dark Current vs. Ambient Temperature

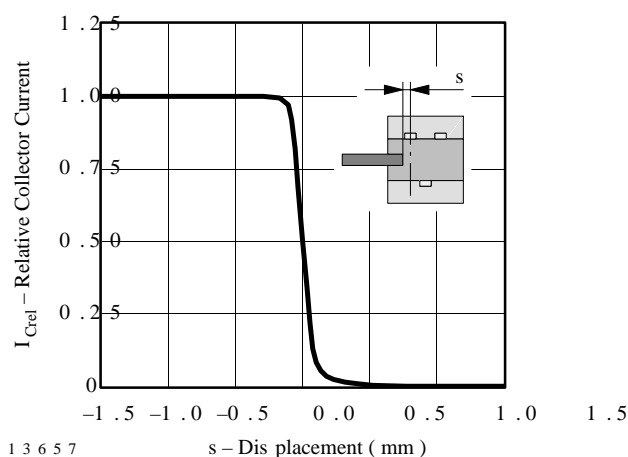


Figure 9. Relative Collector Current vs. Displacement

## Packing

### Dampproof packing

Products will be packed in anti-humidity aluminium bags to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant with moisture indicators. In the event bags absorb moisture, the indicators change their color from blue to pink.

### Recommended method of storage

Dry box storage is recommended to prevent the parts from moisture absorption. The following conditions should be preserved if dry boxes are not available.

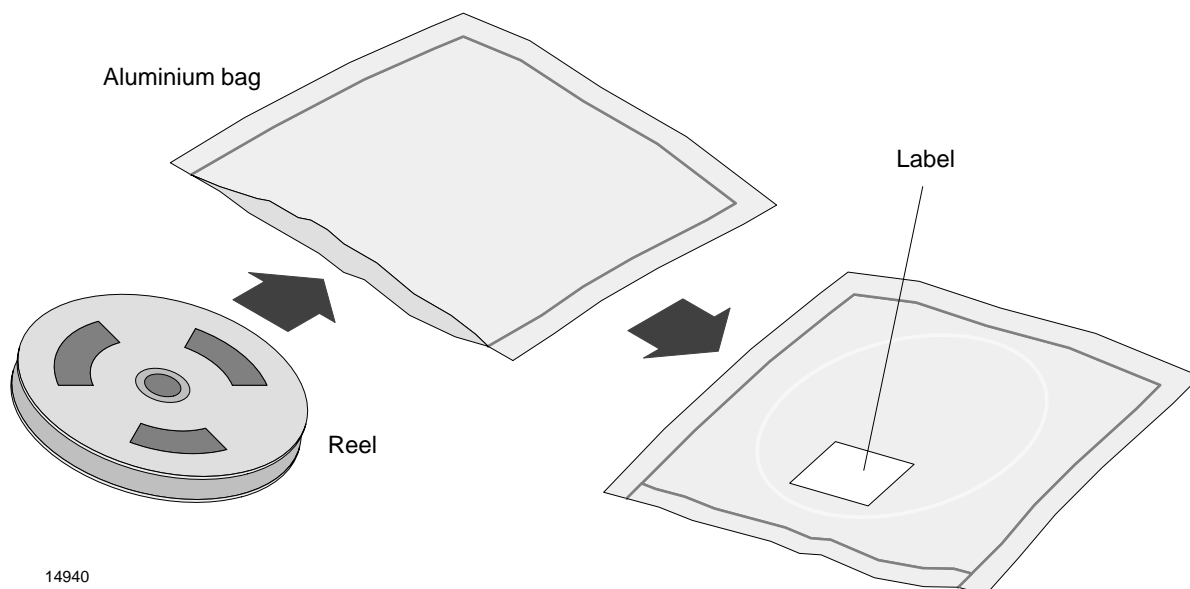
Storage temperature: 10 to 30°C

Storage humidity: 60% RH max

In case of moisture absorption the device will recover to the former condition by drying under the following recommended conditions:

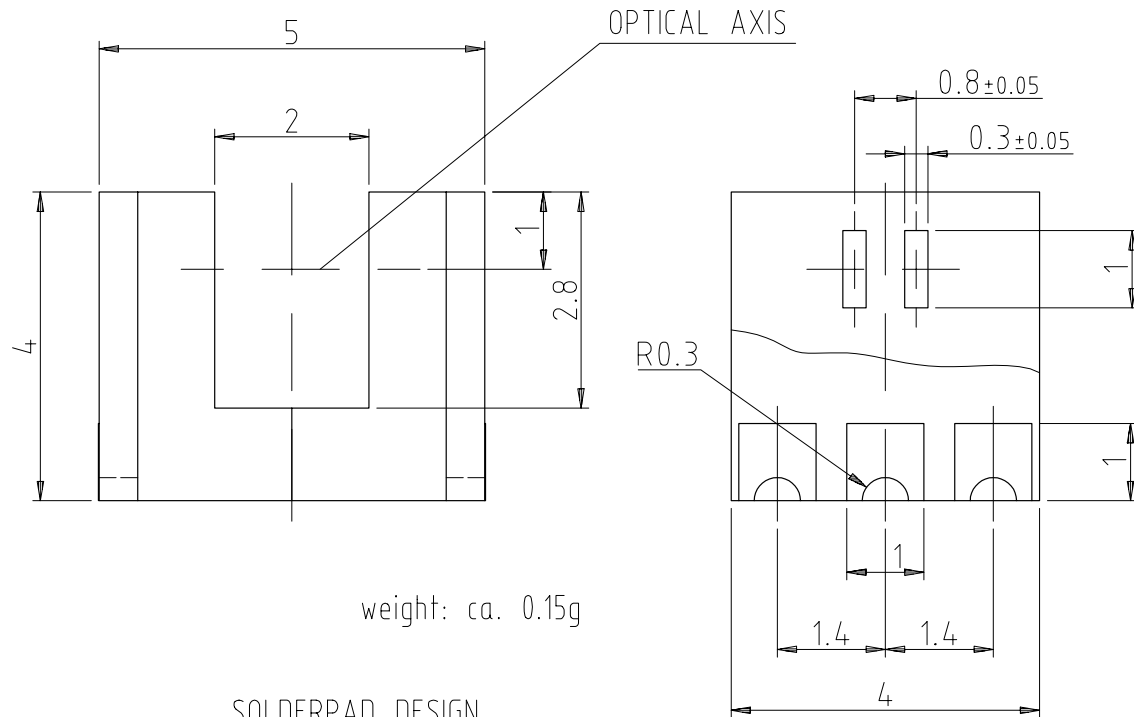
Taped version: 60°C/ 48 h

Untaped version: 60°C/ 48 h

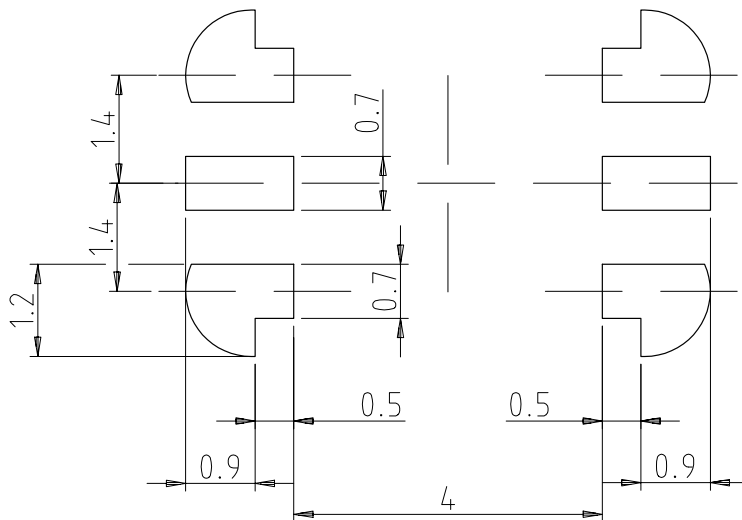


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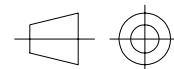
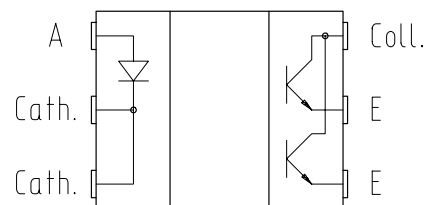
## Dimensions of TCUT1200 in mm



### SOLDERPAD DESIGN



### PIN CONNECTION TOP VIEW



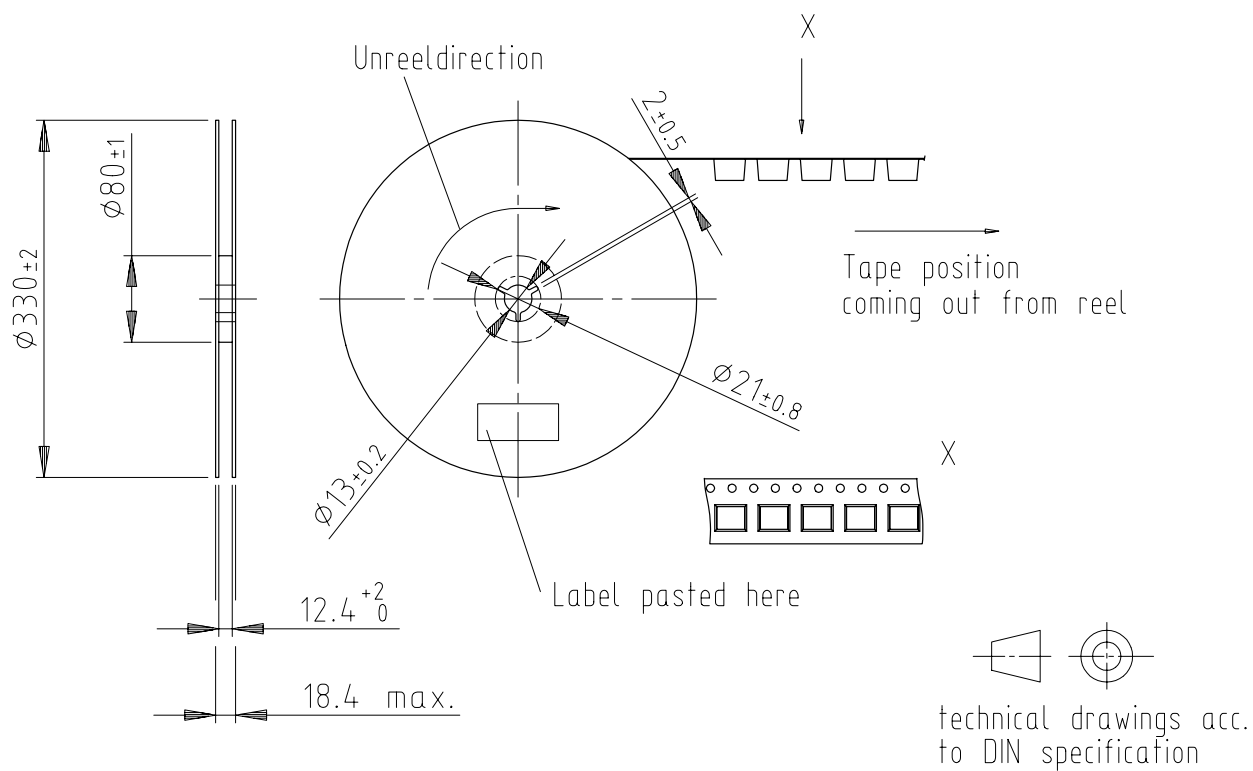
technical drawings  
according to DIN  
specifications

1 2 8 9 8

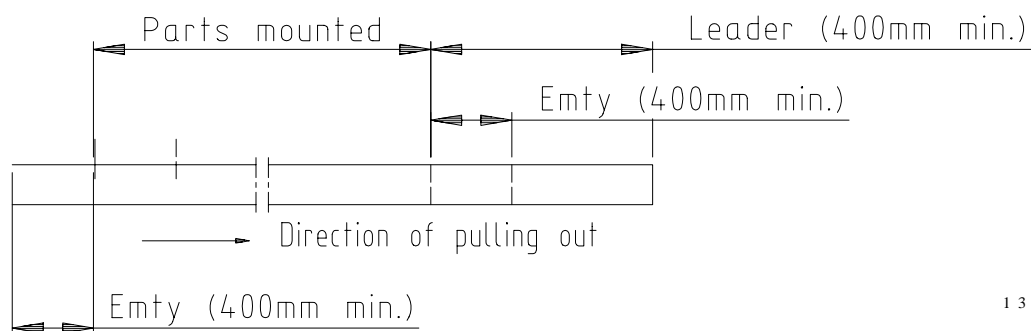
All dimensions in mm  
Not indicated tolerances ±0.15

## Dimensions of Reel and Shape in mm

Reel-dimension and shape:

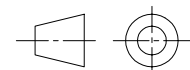
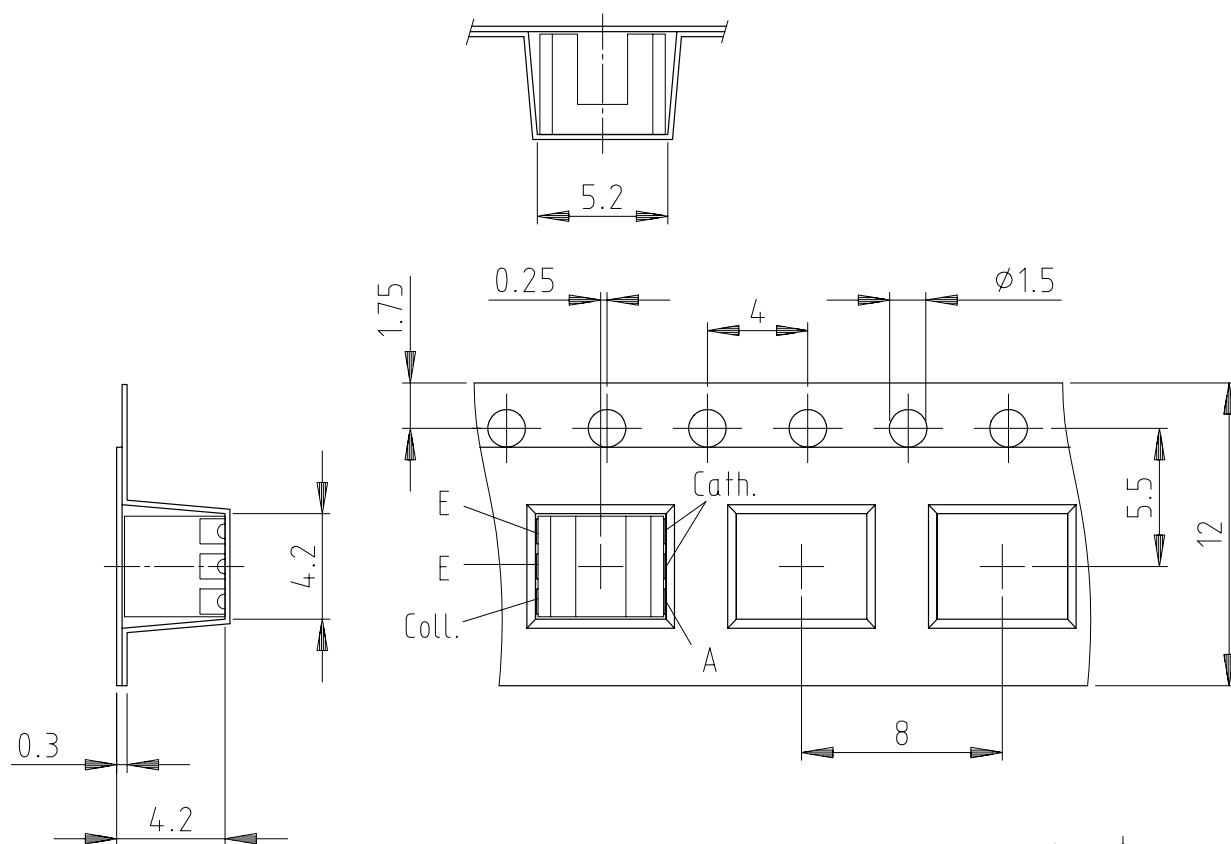


Leader and trailer tape:



1 3 7 2 2

## Dimensions of Tape in mm



technical drawings acc.  
to DIN specification

Quantity per reel: 2000 pcs.

1 3 7 2 0





## **Ozone Depleting Substances Policy Statement**

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay Telefunken against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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